

CLAIMS

I claim:

1. A non-aqueous suspension, comprising:
 - (a) solid particles;
 - (b) polyalkylene glycol; and
 - (c) a suspension stabilizer comprising a hydrogenated castor oil or wax.
2. The non-aqueous suspension according to claim 1 wherein the polyalkylene glycol is selected from the group consisting of polyethylene glycol, polypropylene glycol ethylene oxide propylene oxide block copolymers, and mixtures thereof.
3. The non-aqueous suspension according to claim 1 wherein the amount of suspension stabilizer comprises between about 0.1 and about 5.0 percent by weight of the suspension.
4. The non-aqueous suspension according to claim 1 wherein the solid particles comprise inorganic particles.
5. The non-aqueous suspension according to claim 4 wherein the solid particles comprise boron compounds.
6. The non-aqueous suspension according to claim 4 wherein the solid particles comprise alkaline earth peroxides.
7. The non-aqueous suspension according to claim 4 wherein the solid particles comprise magnesium peroxide or calcium peroxide.
8. The non-aqueous suspension according to claim 4 wherein the solid particles comprise iron oxide.
9. The non-aqueous suspension according to claim 4 wherein the solid particles comprise calcium aluminate.

10. The non-aqueous suspension according to claim 4 wherein the solid particles comprise calcium carbonate, magnesium carbonate, calcium oxide, magnesium oxide, calcium hydroxide and magnesium hydroxide and mixtures thereof.
11. The non-aqueous suspension according to claim 4 wherein the particles comprise siliceous or ceramic particles.
12. The non-aqueous suspension according to claim 1 wherein the solid particles comprise organic particles.
13. The non-aqueous suspension according to claim 12 wherein the particles comprise gilsonite.
14. The non-aqueous suspension according to claim 12 wherein the solid particles comprise lignosulfonates and the sodium, potassium, ammonium, calcium and magnesium salts thereof.
15. The non-aqueous suspension according to claim 12 wherein the solid particles comprise ethylenediaminetetraacetic acid and the salts thereof.
16. The non-aqueous suspension according to claim 1, further comprising one or more of the following additive materials selected from the group consisting of proppants, antifoaming agents, surfactants, corrosion inhibitors, pH buffers, and preservatives.
17. The non-aqueous suspension according to claim 1 wherein the particles comprise an average particle size of about 0.1 to about 600 microns.
18. The non-aqueous suspension according to claim 1 wherein the particles comprise an average particle size of 1 to 300 microns.
19. The non-aqueous suspension according to claim 1 wherein the particles comprise an average particle size of 5 to 200 microns.

20. The non-aqueous suspension according to claim 1 wherein the polyalkylene glycol further comprises between about 0.1 and 4% by weight of the polyalkylene glycol of a thickener selected from the group consisting of partially neutralized polyacrylic acid, hydroxypropyl cellulose, highly substituted hydroxypropyl guar, fumed silica, hydrophobic silica, and mixtures thereof.

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21. The non-aqueous suspension according to claim 1 wherein the particles comprise fertilizers selected from the group consisting of potassium nitrate, ammonium dihydrogenphosphate, ammonium nitrate, sodium nitrate ammonium phosphate, ammonium polyphosphate, potassium hydrogen phosphate, disodium hydrogen phosphate, urea, and mixtures thereof.

22. The non-aqueous suspension according to claim 1 wherein the particles comprise pesticides selected from the group consisting of boric acid, butocarboxime, acephate, dimethoate, dimehypo, vamidothion, methomyl and mixtures thereof.

23. The non-aqueous suspension according to claim 1 wherein the particles comprise herbicides selected from the group consisting of dalapon (2,2 dichloropropirionic acid, sodium salt) ammonium sulfamate, dicamba, cacodylic acid, fomesafen; glyphosate and mixtures thereof.

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24. The non-aqueous suspension according to claim 1 wherein the particles comprise fungicides selected from the group consisting of copper sulfate, fosetyl-Al aluminum tris (O-ethyl phosphonate), benalaxyl, guazatine, kasugamycin and mixtures thereof.

25. The non-aqueous suspension according to claim 1 wherein the solid particles comprise non-polymeric particles.

26. The non-aqueous suspension according to claim 1 wherein the amount of the solid particles comprises between about 0.1 and about 75 percent by weight of the suspension.

27. The non-aqueous suspension according to claim 1 wherein the amount of polyalkylene glycol comprises between about 24 and about 99 percent by weight of the suspension.

28. A composition comprising environmental chemical, agricultural chemical, paper chemical, textile chemical, construction or building product ingredient (such as paint, joint cement, textured finishing compound), cosmetic ingredients, hair spray, gelatin substitute, ceramic material, cleaning composition, polish, ink, fire-fighting chemical, metal-working chemical, adhesive chemical, explosive chemical, flocculent, water treatment compound, binder chemical for sand, ores or coal or oil field chemical that includes a non-aqueous suspension, comprising:

- (a) solid particles;
- (b) polyalkylene glycol; and
- (c) a suspension stabilizer comprising a hydrogenated castor wax.

29. The non-aqueous suspension according to claim 28 wherein the polyalkylene glycol is selected from the group consisting of polyethylene glycol, polypropylene glycol, ethylene oxide propylene oxide block copolymers, and mixtures thereof.

30. The non-aqueous suspension according to claim 28 wherein the amount of suspension stabilizer comprises between about 0.1 and about 5.0 percent by weight of the suspension.

31. The non-aqueous suspension according to claim 28 wherein the solid particles comprise inorganic particles.

32. The non-aqueous suspension according to claim 31 wherein the solid particles comprise boron compounds.

33. The non-aqueous suspension according to claim 31 wherein the solid particles comprise alkaline earth peroxides.

34. The non-aqueous suspension according to claim 31 wherein the solid particles comprise magnesium peroxide or calcium peroxide.

35. The non-aqueous suspension according to claim 31 wherein the solid particles comprise iron oxide.

36. The non-aqueous suspension according to claim 31 wherein the solid particles comprise calcium aluminate.

37. The non-aqueous suspension according to claim 31 wherein the solid particles comprise calcium carbonate, magnesium carbonate, calcium oxide, magnesium oxide, calcium hydroxide and magnesium hydroxide and mixtures thereof.

38. The non-aqueous suspension according to claim 31 wherein the particles comprise siliceous or ceramic particles.

39. The non-aqueous suspension according to claim 28 wherein the solid particles comprise organic particles.

40. The non-aqueous suspension according to claim 39 wherein the particles comprise gilsonite.

41. The non-aqueous suspension according to claim 39 wherein the solid particles comprise lignosulfonates and the sodium, potassium, ammonium, calcium and magnesium salts thereof.

42. The non-aqueous suspension according to claim 39 wherein the solid particles comprise ethylenediaminetetraacetic acid and the salts thereof.

43. The non-aqueous suspension according to claim 28, further comprising one or more of the following additive materials selected from the group consisting of proppants, antifoaming agents, surfactants, corrosion inhibitors, pH buffers, and preservatives.

44. The non-aqueous suspension according to claim 28 wherein the particles comprise an average particle size of about 0.1 to about 600 microns.

45. The non-aqueous suspension according to claim 28 wherein the particles comprise an average particle size of 1 to 300 microns.

46. The non-aqueous suspension according to claim 28 wherein the particles comprise an average particle size of 5 to 200 microns.

47. The non-aqueous suspension according to claim 28 wherein the polyalkylene glycol further comprises between about 0.1 and 4% by weight of the polyalkylene glycol of a thickener selected from the group consisting of partially neutralized polyacrylic acid, hydroxypropyl cellulose, highly substituted hydroxypropyl guar, fumed silica, hydrophobic silica, and mixtures thereof.

48. The non-aqueous suspension according to claim 28 wherein the particles comprise fertilizers selected from the group consisting of potassium nitrate, ammonium dihydrogenphosphate, ammonium nitrate, sodium nitrate ammonium phosphate, ammonium polyphosphate, potassium hydrogen phosphate, disodium hydrogen phosphate, urea, and mixtures thereof.

49. The non-aqueous suspension according to claim 28 wherein the particles comprise pesticides selected from the group consisting of boric acid, butocarboxime, acephate, dimethoate, dimehypo, vamidothion, methomyl and mixtures thereof.

50. The non-aqueous suspension according to claim 28 wherein the particles comprise herbicides selected from the group consisting of dalapon (2,2 dichloropropirionic acid, sodium salt) ammonium sulfamate, dicamba, cacodylic acid, fomesafen; glyphosate and mixtures thereof.

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Q7 51. The non-aqueous suspension according to claim 28 wherein the particles comprise fungicides selected from the group consisting of copper sulfate, fosetyl-Al aluminum tris (O-ethyl phosphonate), benalaxyl, guazatine, kasugamycin and mixtures thereof.

52. The non-aqueous suspension according to claim 28 wherein the solid particles comprise non-polymeric particles.

53. The non-aqueous suspension according to claim 28 wherein the amount of the solid particles comprises between about 0.1 and about 75 percent by weight of the suspension.

54. The non-aqueous suspension according to claim 28 wherein the amount of polyalkylene glycol comprises between about 24 and about 99 percent by weight of the suspension.

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Q8 55. A method of formulating a non-aqueous suspension, comprising:
dispersing solid particles and a hydrogenated castor wax or oil into polyalkylene glycol;
and
mixing the solid particles, the hydrogenated castor wax or oil, and the polyalkylene glycol until the solid particles are uniformly dispersed in the polyalkylene glycol and the hydrogenated castor wax develops desired suspension properties.

56. The method according to claim 55 wherein the solid particles are dispersed in an amount from between about 0.1 and about 75 percent by weight of the suspension.

57. The method according to claim 55 wherein the hydrogenated castor wax or oil is dispersed in an amount between about 0.1 and about 5.0 percent by weight of the suspension.

58. The method according to claim 55 wherein the amount of polyalkylene glycol comprises between about 24 and about 99 percent by weight of the suspension.
59. The method according to claim 55 wherein the polyalkylene glycol is selected from the group consisting of polyethylene glycol, polypropylene glycol, ethylene oxide propylene oxide block copolymers, and mixtures thereof.
60. The method according to claim 55 wherein the solid particles comprise inorganic particles.
61. The method according to claim 60 wherein the solid particles comprise boron compounds.
62. The method according to claim 60 wherein the solid particles comprise alkaline earth peroxides.
63. The method according to claim 60 wherein the solid particles comprise magnesium peroxide or calcium peroxide.
64. The method according to claim 60 wherein the solid particles comprise iron oxide.
65. The method according to claim 60 wherein the solid particles comprise calcium aluminate.
66. The method according to claim 60 wherein the solid particles comprise calcium carbonate, magnesium carbonate, calcium oxide, magnesium oxide, calcium hydroxide and magnesium hydroxide and mixtures thereof.
67. The method according to claim 60 wherein the particles comprise siliceous or ceramic particles.
68. The method according to claim 55 wherein the solid particles comprise organic particles.
69. The method according to claim 68 wherein the particles comprise gilsonite.

70. The method according to claim 68 wherein the solid particles comprise lignosulfonates and the sodium, potassium, ammonium, calcium and magnesium salts thereof.

71. The method according to claim 68 wherein the solid particles comprise ethylenediaminetetraacetic acid and the salts thereof.

72. The method according to claim 55, further comprising one or more of the following additive materials selected from the group consisting of proppants, antifoaming agents, surfactants, corrosion inhibitors, pH buffers, and preservatives.

73. The method according to claim 55 wherein the particles comprise an average particle size of about 0.1 to about 600 microns.

74. The method according to claim 55 wherein the particles comprise an average particle size of 1 to 300 microns.

75. The method according to claim 55 wherein the particles comprise an average particle size of 5 to 200 microns.

76. The method according to claim 55 wherein the polyalkylene glycol further comprises between about 0.1 and 4% by weight of the polyalkylene glycol of a thickener selected from the group consisting of partially neutralized polyacrylic acid, hydroxypropyl cellulose, highly substituted hydroxypropyl guar, fumed silica, hydrophobic silica, and mixtures thereof.

77. The method according to claim 55 wherein the particles comprise fertilizers selected from the group consisting of potassium nitrate, ammonium dihydrogenphosphate, ammonium nitrate, sodium nitrate ammonium phosphate, ammonium polyphosphate, potassium hydrogen phosphate, disodium hydrogen phosphate, urea, and mixtures thereof.

78. The method according to claim 55 wherein the particles comprise pesticides selected from the group consisting of boric acid, butocarboxime, acephate, dimethoate, dimehypo, vamidothion, methomyl and mixtures thereof.

79. The method according to claim 55 wherein the particles comprise herbicides selected from the group consisting of dalapon (2,2 dichloropropirionic acid, sodium salt) ammonium sulfamate, dicamba, cacodylic acid, fomesafen; glyphosate and mixtures thereof.

80. The method according to claim 55 wherein the particles comprise fungicides selected from the group consisting of copper sulfate, fosetyl-Al aluminum tris (O-ethyl phosphonate), benalaxyl, guazatine, kasugamycin and mixtures thereof.

81. The method according to claim 55 wherein the solid particles comprise non-polymeric particles.